CAPITAL REGION GEOGRAPHIC INFORMATION SERVICES (CRGIS):
STRATEGY AND IMPLEMENTATION PLAN

Appendix 4
March 2009

GROWING
FORWARD
The Capital Region Growth Plan

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SECTION 1
CONTEXT

This document, the Final Report for the Capital Region Geographic Information Services (CRGIS) Strategy and Implementation Plan, describes the comprehensive plan.

Capital Region Board

On April 15, 2008, the Government of Alberta established the Capital Region Board (CRB) whose mandate is to prepare a proposed Capital Region Growth Plan (Growth Plan) by March 31, 2009.

The CRB consisting of twenty-five participating municipalities, will develop and implement regional policies; jointly address regional development and service delivery opportunities and issues; and prepare an integrated growth management plan for the Capital Region.

The objectives of the Growth Plan include:
- an integrated and strategic approach to planning for future growth in the Capital Region;
- identification of an overall development pattern and key future infrastructure investments that
  - best complement existing infrastructure, services and land uses in the Region; and
  - maximize benefits to the Region.
- co-ordination of decisions in the Capital Region to:
  - sustain economic growth;
  - ensure strong communities; and
  - ensure a healthy environment.

Priority Areas

The immediate focus for the Capital Region Growth Plan includes four key priority areas, namely:
- land use;
- intermunicipal transit network;

> social and market affordable housing; and
> geographic information services.

To meet the Growth Plan objectives, and solve the complex economic, environmental and social issues facing the Capital Region, the CRB will require the ability to collect and analyze regional information to enable effective decision making regarding matters of regional importance.

A set of tools is needed to enable the Capital Region to support future planning and assist with the implementation of the land use, transit and housing plans. These tools are found with a regional Geographic Information Services (GIS).

Geographic Information Services (GIS) Plan Mandate

A mandate for a GIS Plan is supported in the Capital Region Board Regulation. Section 12 of the Capital Region Board Regulation mandates the GIS Plan to include:

> protocols and methods for collecting, sorting and accessing data;
> protocols and methods for compiling and analyzing information; and
> standardized terminology and standards for mapping capabilities.

This mandate was translated into a project with a deliverable of the CRGIS Plan. Contributors to this project have included elected officials, municipal administrators, senior planners and municipal geographic information experts (Appendix A).

The goal of this CRGIS Plan is to expand the regional capacity to deliver geographically-based information and services that support sustainable land use, public transit and housing decisions through collaboration of the Board and its member municipalities. Since the GIS is a tool to support the other elements of the Growth Plan, further work on this CRGIS Plan may be required to ensure the CRGIS best enables the management of the Growth Plan.

Successfully addressing this mandate requires a further understanding of the business and information needs of each priority area within the Growth Plan (Appendix B). Protocols, methods and standards will also need to be developed for the people, process, technology and data elements of the CRGIS. Once the land use, transit and housing information needs are fully determined the specific CRGIS data layers (Appendix C), technology and services can be developed along with related protocols, methods and standards (Appendix D).

Common terms related to GIS are included in Appendix E. A map of the Capital Region is provided in Appendix H.

SECTION 2

WHAT ARE GEOGRAPHIC INFORMATION SERVICES?

Definition for Geographic Information Services

Geographic Information Services is used interchangeably with geographic information systems in this report. Other common terms related to GIS can be found in the Glossary (Appendix E).

In simple terms a GIS:

- links databases and maps;
- manages information about places; and
- helps answer questions such as:
  - Where is it?
  - What else is nearby?
  - Where is the highest concentration of 'X'?
  - Where can I find things with characteristic 'Y'?
  - Where is the closest 'Z' to my location?

What a GIS does can be defined as follows:

- A geographic information system (GIS) is a computer based tool for mapping and analyzing things that exist and events that happen on earth
- Burrough in 1986 defined GIS as, "a set of tools for collecting, storing, retrieving at will, transforming and displaying (geo)spatial data from the real world for a particular set of purposes"
- Arnoff in 1989 defines GIS as, "a computer based system that provides four sets of capabilities to handle spatial data:
  - data input;
  - data management (data storage and retrieval);
  - manipulation and analysis; and
  - data output. "

The common components of a GIS include:

- layers of data and information organized on a geographic basis;
- a range of services that identify, collect, sort and provide access to information;
- the technology (e.g. a computer software package and hardware) that allows data to be compiled and analyzed;
- the people and processes required to deliver the services; and
- the protocols, methods and standards to support the data and services.

Therefore GIS is looked upon as a tool to assist in decision making and management of attributes that need to be analyzed spatially. In a GIS, data is created and maintained in a manner that is usable by many different organizations. Data layers can be overlaid to determine how the geography of one layer may impact another. A layer of information can be used across many different GIS or projects, which eliminates the need to create multiple copies of the same data and update all those copies when data changes occur.

Geospatial Information or Data

Geography is a natural structure for organizing data. Geographic information is information relating to the location and names of features beneath, on or above the surface of the earth. Spatial or geospatial information shows the location, shape and relationships between features on the earth's surface. Each map feature has a specific geographic location.

The map of the Capital Region shows many types of data (Appendix H). However within that map are actually many layers, each that have particular importance and meaning.

Most human activity depends on geographic information – on knowing where things are and understanding how they relate to one another. It is part of our daily lives, essential for making decisions on social or environmental issues, for running an election, responding to emergencies or finding our way across town. Information about people and places is vital for an informed government and its citizens.

Nearly all information has a location dimension, whether it is infrastructure, a house or building address, a road, a voting district or a municipal boundary. In providing services to the region, stakeholders will have growing needs for geographic information to efficiently plan and manage land use and infrastructure.

The following illustration (Figure 1) depicts the various geospatial data or information layers associated with the land and a relationship between that information and various regional issues (e.g. land use):

Land Use/Land Cover

Imagery

Environment

Topography

Social Factors

Roads/Infrastructure

Hydrology

Integrating Disciplines, Organizations and Activities
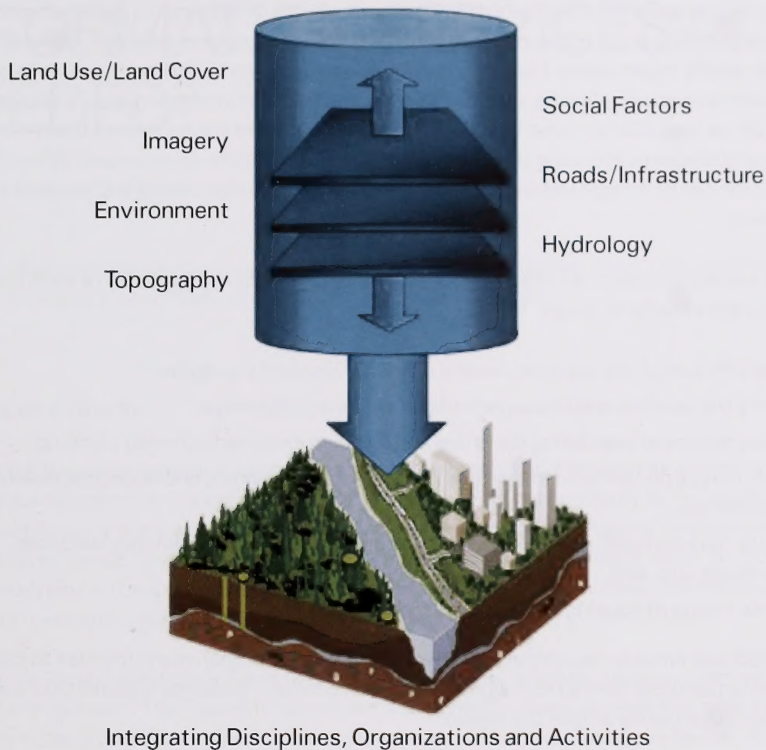
Figure 1: Geospatial Data Layers

The Value of Geographic Information Services

Geographic information services use maps to represent land based features such as boundaries, land use, roads and water lines. Furthermore, GIS store data related to each feature to provide intelligent and powerful analysis capabilities. They allow an organized view of the region and provide the municipalities and the CRB the ability to understand the interrelationship between different kinds of data.

One of the most useful features of a GIS is its ability to overlay a wide variety of disparate information on a map in order to see how these different data sets combine to answer questions and solve problems.

GIS can also be an integrating technology. Interoperability of information enables more effective use of multiple organization resources to improve regional services. GIS enables interoperability by providing a common information framework. GIS improves information access and relevance by linking all information to the land and a common geo-reference point or area of the land. GIS provides the knowledge to analyze and solve some of today's most challenging problems including those in our communities and the environment. When this information can be integrated and shared, new questions are discovered and answers can be realized.

GIS is a visualization tool for organizing a region's data that can be applied to a wide spectrum of issues and situations. It can:

▶ create a picture of the socio-economic characteristics of the region;
▶ identify the location and characteristics of roads and highways;
▶ create a picture of population densities and age distributions for transit planning;
▶ create a single picture of land use districts for land use planning and economic development opportunities;
▶ identify the locations, characteristics (and conditions) of water features, wetlands, watersheds, etc. and,
▶ provide a view of housing trends types and affordability.

The CRGIS will provide the context for twenty-five Capital Region municipalities to coordinate information services related to the geography of the region, including regional data and information for the benefit of the region.

WHY ARE GEOGRAPHIC INFORMATION SERVICES NEEDED?

Municipalities without good information and data may plan, especially on their borders, in ways that impact others in the Capital Region.

Impact of Growth

The Capital Region is fortunate to have an abundance of vibrant urban and rural municipalities and a beautiful natural environment. This rich heritage contributes greatly to the quality of life that Albertans enjoy. The Region faces challenges, including ongoing development, its cumulative impact on the environment and the sustainability of communities. By 2043, the Capital Region is expected to grow by over 750,000 people and will see 285,000 jobs created in the region and 200,000+ new households built.

The Capital Region needs new ways to continue to develop, while sustaining communities and the environment. The Capital Region must also consider global competitiveness and how economic growth can ensure citizens, visitors and industry will realize a benefit for future generations.

The Capital Region has a rare opportunity to proactively solve the increasingly complex and interrelated economic, social and environmental issues surrounding the Capital Region. Additionally, the significant municipal infrastructure deficit and the need for new investments will demand improved geographic information to assist decision making.

To accommodate this growth, the Capital Region will need to plan and make decisions differently than in the past to preserve the quality of life currently enjoyed by its citizens. Through a shared vision and a commitment to common growth principles and policies, the Region has an opportunity to ensure long term sustainability. However, this will require:

> coordinated planning across the Capital Region that considers infrastructure investment decisions;

> regional decision making about land uses, intermunicipal transportation and the need for affordable housing to meet the changing demographics across the Capital Region; and

> a shared commitment to protect designated areas from premature and inappropriate development that would negate their use for future development or impact adjacent uses.

The achievement of outcomes including sustainability outcomes (economy, environment and social) and intended outcomes from land use, transit and housing planning is linked to the data and information supporting decisions. The above is reflected in the following diagram (Figure 2):
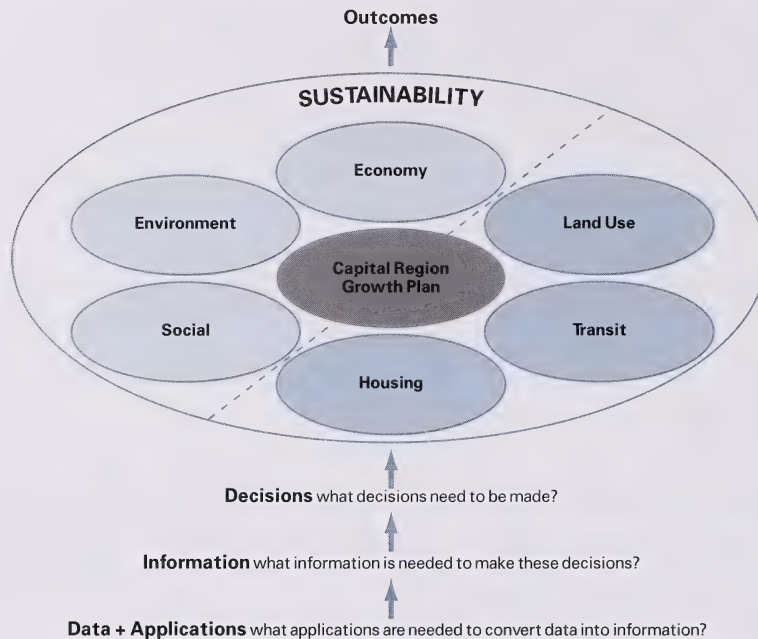
Figure 2: CRGIS Enabling Sustainability

The success of the Capital Region Growth Plan rests on the ability of the municipalities to work together to improve collective planning and decision making regarding matters of regional importance. Solving these complex issues requires information specific to the Capital Region and services supporting a regional view or picture.

Value of Information

Basic information about the land and related activities is needed to help with better regional decision making.

▸ Capital Region municipalities need a consistent and accurate view of the Capital Region to make those decisions. However, much of the information needed for land use, transit and housing does not currently exist for much of the Capital Region.

▸ All Capital Region municipalities will benefit from an understanding of the Capital Region and the results from analysis of the Capital Region (e.g. priority setting).

Municipalities without good information and data may plan, especially on their borders, in ways that impact others in the Capital Region. Unnecessary costs and redundancy could result from lack of good information and data.

Challenges

GIS are more than technology, they include the data or information and the analysis and other services necessary to understand the geography and its relationship to people, the environment and other factors.

The anticipated challenges in establishing and sustaining a CRGIS include:
- governance;
- a sustainable funding model;
- data sharing and licensing;
- data gathering costs and efforts; and
- data maintenance and presentation.

The main cost for GIS resides with the gathering and maintenance of data. Often infrastructure, data and human resourcescan be leveraged toward a regional system. However, the notion of simply gathering regional data is only the first step. The data must be brought together, analyzed and maintained (e.g. updated on a regular basis).

This leads to further challenges including:
- service operations and delivery;
- analysis and reporting (sharing of the information and knowledge);
- optimizing costs and benefits (while reducing duplication and redundancies);
- building capacity and a community of regional focus; and
- measuring outputs and outcomes.

Opportunities

Many of the emerging major economic development opportunities in the Capital Region can have an impact on all Capital Region communities. Examples of some strictly economical examples include:
- Alberta's Industrial Heartland;
- Port Alberta;
- Edmonton International Airport;
- Nisku Industrial Park;

‣ Gateway to the North and the Asia/Pacific Corridor; and

‣ Acheson Industrial Park.

One of the most important opportunities may be in creating an equitable situation where all municipalities are able to understand and participate in the processes for planning within the Capital Region. This opportunity means that while some municipalities will continue to develop sophisticated GIS to meet local and intermunicipal needs, all municipalities can benefit from a base of regional information and services.

Local geographic information systems will remain relevant and needed within individual communities which have invested in their information needs and systems. These local needs include infrastructure management, policing, emergency management, social planning and other important community functions. The CRGIS will complement local GIS while working toward a common base of regional information.

Business Drivers

The CRB will need to prepare, gather and analyze a wide set of data and information to ensure evidence based decisions can be made. Currently, consistent information is not available across the Capital Region to support the coordinated planning of land use, public transit networks, social and market affordable housing or the interrelationships between all of these issues.

As identified in the Working Together Report and further to the formation of the CRB the following are the primary business drivers for the CRGIS:

‣ global competitiveness has largely erased "administrative" boundaries;

‣ economic, social and environmental sustainability makes municipal boundaries less relevant;

‣ lack of a common information base for planning purposes for the region;

‣ growing municipal infrastructure deficit;

‣ need for coherent and coordinated land use planning;

‣ need for alignment of transportation, pipeline and utility corridor planning with the provincial government and transit planning across the Capital Region;

‣ need for identification and planning for social and market affordable housing; and

‣ future planning and growth scenarios will require geographic related technology and information.

Further barriers and forces of change faced by the municipalities within the Capital Region are described in the following diagram (Figure 3):
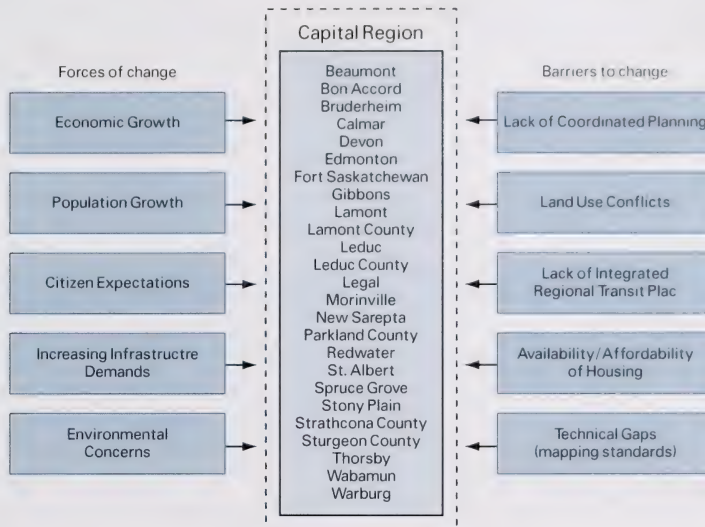
Figure 3: Barriers and Forces of Change

A Potential Future Scenario

Fred, the municipal planner has a very difficult job and that job is getting tougher as growth within and around his community is constrained by an increasing number of factors such as environmental sensitivity, increased traffic volumes and drive times, housing needs and land use.

Fred asks himself a number of questions, including: Where will services be needed in the future? Is there existing water capacity in the adjacent municipality? What future plans does the adjacent municipality have for land use next to our border? What is the demographic profile of that area today? Will I need to plan for schools and green space or upgrade existing major infrastructure to support future industrial growth?

It appears that it would take weeks of effort to assemble the large amounts of required data into a useable and comparable format. Fortunately for Fred, the required information is already available from a regional GIS, accessible through the internet without the need for specialized software.

Now he can go online to view an intelligent map of the entire Capital Region, identify land use zones and query new developments within the neighbouring county. He can also call upon a regional planner to discuss long range plans created and analyzed using population growth models. Fred feels more confident in his decisions and designs, the result of having the best land information available at his fingertips.

SUMMARY OF EXISTING SITUATION

While some "islands of information" exist at a local level, there is no regional "view or picture" and there is no regional GIS.

Key Questions

A review of the existing situation requires the following questions be asked:

▸ What are the municipalities' business needs?

▸ What are the types of information needed?

▸ How can this information be provided?

▸ What is the current state of the people, process, technology and data necessary to support a regional GIS?

The answers to these questions were gathered through a survey, research and consultation with stakeholders.

Initial Survey Findings

Based on a recent survey about GIS conducted with municipalities in the Capital Region the following observations are made:

▸ Among those with municipal GIS, there is a variance in systems, related tools and applications:

- 14 of 25 municipalities are understood to have a municipal geographic information system. Of those:
  - 3 use primarily an Intergraph platform;
  - 10 use primarily an ESRI platform; and
  - 1 uses primarily an Autodesk platform.
- 11 of 25 municipalities are understood to not have a formal in-house GIS.

▸ Currently, there is no consistent information available across the Capital Region to support coordinated land use planning, public transit network planning and social and market affordable housing planning or the interrelationships between all of these issues.

▸ Those municipalities with GIS collect a wide range of data and information to support local needs.

▸ The naming conventions for the data and technology standards vary across those with GIS.

▸ The GIS capacity and skills vary broadly across the Capital Region.

▸ Those municipalities with GIS have revealed they are busy and do not have excess capacity.

Many of the municipalities currently utilizing GIS have common geospatial data layers captured as part of their system. Common geospatial data layers (Table 1) include:

Themes	Description /examples
Base map	Cadastral base map or land parcels
Addressing	Civic addressing and legal addressing linked to parcel
Transportation	Single line street or road network
Infrastructure	Water, fire hydrants, sewer, storm, etc.
Boundries	Land use zoning, enumeration areas, neighbourhoods
Demographic data	Census data collected by Municipality or Stats Canada (tabular)

Table 1: Common Geospatial Data

Initial Survey Observations

▸ The current landscape of GIS technology across the Capital Region is varied. Some municipalities have made significant local investments and, as a result have well developed mature GIS while others have not yet begun to use GIS.

▸ Many municipalities do not have geospatial data or have very limited data in commonly accepted formats.

▸ While some "islands of information" exist at a local level, there is no regional "view or picture" and there is no regional GIS.

▸ Municipalities in the Capital Region have been cooperating on various levels for many years toward sharing geospatial information. These data sharing efforts have typically been at a sub regional level and rarely have they been on a regional level. It is clear that these interactions have been sporadic and often focused on local or intermunicipal needs.

▸ The Capital Region needs to prepare, gather and analyze a wide set of data and information to ensure evidence based decisions can be made.

The review of the existing situation reveals a need for people, process, technology and data to be put in place to specifically enable a regional GIS. The above assessment will require a more comprehensive understanding and series of inventory, assessment and business case projects. These have been identified within the CRGIS Plan.

The above is validated by similar findings from the efforts of the Alberta Capital Region Alliance (ACRA) and the University of Alberta (U of A) in 2007 including:

▶ Individual municipalities/organizations in the Edmonton Region have been developing their own GIS systems and not necessarily considering such aspects as interoperability, sharing with other jurisdictions, collaborating to reduce costs, etc.

▶ There are wide variations in the types, quality and format of information and data that are available in individual municipalities in the region. There are gaps in data, and much of what is available is not in GIS ready format.

▶ While many databases exist, often information about the data has not been developed and metadata is not available. Challenges also exist in determining how the metadata will be disseminated.

Provincial Efforts

There are a tremendous number of opportunities to work with the provincial government. Of significance are a number of initiatives related to geomatics and geospatial information occurring within the Government of Alberta.

Alberta Advanced Education and Technology has been a leader in developing the Integrated Resource Management Initiative. This initiative included the development of a strategy and business case for advancing geomatics within the Province of Alberta. The benefits of this initiative considered a broad set of Alberta municipal needs.

Alberta Sustainable Resource Development is currently leading the development of the Alberta Integrated Information Management System which is evolving toward "GeoDiscover", a portal for providing access to government geospatial data.

These initiatives highlight the growing importance of GIS and geospatial information for a broad set of needs within Alberta. They also highlight an opportunity for the CRB through the CRGIS, to work closely with the Provincial Government toward common GIS solutions.

Federal Efforts

The Government of Canada continues to be a global leader in geomatics and the management of geospatial information. There are numerous opportunities to work with the Federal Government on geospatial infrastructures.

The continuing enhancements of the "GeoBase", a national portal for base data like roads, hydrography and boundaries illustrates the results from strong inter-jurisdictional cooperation toward creating shared sets of information.

SECTION 5

RESEARCH AND CONSULTATION

The key message is that a regional GIS is needed and stakeholders are interested but the necessary environment and commitment has not manifested in the execution of the regional GIS planning efforts.

Literature Review

A broad set of documents (Appendix F) have been reviewed including those related to past Capital Region efforts toward a regional GIS, the Working Together Report and CRB materials (Appendix F). This literature review is important for identifying:

▸ What past efforts have occurred within the Capital Region?
▸ What are the relevant strategic context materials?

There have been significant attempts over the last ten years to move toward the concept of a regional GIS for the Capital Region. The first formal efforts were taken in 2001, when the Alberta Capital Region Governance Review was completed. This project brought a wide set of stakeholders together including elected officials, municipal administrators, financial personnel and geographic and information technology (IT) experts. Ultimately this effort did not lead to a regional GIS.

In 2002, The Regional GIS Land Inventory Project was created to provide an interactive map of Alberta's International Region easily accessed on the internet. The Regional GIS Land Inventory Project was a partnership between Leduc County, the City of Leduc, Edmonton Airports and the Towns of Beaumont and Devon. The map was to include search features that businesses, corporations, organizations and individuals could use to identify properties and/or buildings available for rent or purchase in the International Region. This project produced significant cooperation across several municipalities but did not evolve into any form of a regional GIS.

Several years later, another project was undertaken through ACRA with the idea that academia and municipalities had joint interests and that both could benefit from a regional GIS or spatial data warehouse. ACRA and the U of A proposed to develop a regional GIS that could accommodate any regional initiative. While this project identified significant opportunities for collaboration across government, industry and academia, it also did not result in a regional GIS.

These efforts have demonstrated that many challenges and opportunities exist in successfully implementing a regional GIS in the Capital Region. Much has been learned from these efforts including the critical success factors, the risks and the building blocks on which a regional GIS should be built.

However, each of the above examples represents significant lessons learned over a 10 year period. The key message is that a regional GIS is needed and stakeholders are interested but the necessary environment and political will has not manifested in the execution of the regional GIS planning efforts.

Consultation

> Widespread support for a regional GIS exists … this does not mean migrating existing systems to one system or replacing all GIS within the Capital Region. Rather … enabling a regional view or picture for all municipalities to participate in and benefit from.

The following steps were taken to develop the CRGIS strategy and implementation plan:

- assessment of the current state of regional geographic systems, services, resources, processes and technologies;
- consultation with the GIS community through representatives on a Technical Sub Committee;
- consultation on issues of governance and a business model through a subset of the GIS Working Committee on a Governance Sub Committee;
- definition of the future state for regional geographic information services (including a vision, mission, guiding principles and strategic goals for a CRGIS);
- evaluation of the gap between the current state and future state;
- development of a implementation plan for closing the gap;
- presentation of recommendations to the CRB;
- consultation (i.e. interviews and workshops) with elected officials, municipal administrators, senior municipal planners and geographic information experts to understand the business needs for a CRGIS; and
- consultation with committee members from land use, intermunicipal transit and social and market affordable housing committees regarding business, information and data needs.

Appendix A identities key contributors to the development of the CRGIS Plan.

The stakeholders provided widespread support for a regional GIS that supports the services and analysis of information for regional decision making. This does not mean migrating existing systems to one system or replacing all GIS within the Capital Region. Rather, the plan provides support for a separate system and a set of services to enable a regional view or picture for all municipalities to participate in and benefit from.

Consultation with stakeholders and experts revealed a number of considerations for a CRGIS Plan.

These considerations include:

▶ Readiness
- The needed information and relevant data to support decision making has not been determined and in many cases does not exist.
- A common understanding of definitions and terminology for land use, transit and housing needs has not been developed.
- No common and consistent data sharing agreements exists among Municipalities and there is a lack of a data sharing culture in the Capital Region.
- There is no CRGIS system or available GIS capacity to focus on the necessary regional analysis.
- GIS efforts to date have largely focused on local or intermunicipal needs.
- The approach to data sharing has been toward revenue generation and cost recovery, not the outcomes of information sharing.

▶ GIS and Related Technology
- Among those with GIS, there is a variance in systems and there are numerous tools and applications used in conjunction with GIS.
- A few municipalities have GIS that could be characterized as "enterprise level".
- Several attempts have been made within sub-regions for site locators and economic development tools.
- Numerous issues exist for connecting existing GIS and IT infrastructure and data sharing across the Capital Region (e.g. server based versus local IT).
- There is a wide variance in awareness, maturity and capacity of GIS resources.
- A core of GIS experts exists with expertise on local infrastructure and service delivery.

▶ Geospatial Data

- There currently is no efficient or effective way to locate existing data produced by municipalities in the Capital Region.
- While a broad set of locally developed data exists, much of the data needed will be required through a third party or will need to be created.
- The state (e.g. paper records) of data within non-GIS municipalities is unknown.
- Protocols, methods and standards appear to be diverse across those with GIS.
- Numerous data licensing agreements are in place for data sources (e.g. AltaLIS).
- Data to support land use, transit and housing needs is not consistently defined, and does not exist regionally.

Research

Research based on North American examples has determined that the best practices for achieving success with a regional GIS include (Appendix F and G) :

▶ developing a shared vision for the GIS;

▶ developing strategic goals;

▶ identifying sustainable long term funding;

▶ implementing an appropriate governance model;

▶ providing competent leadership and expertise;

▶ investing in data and technology based on business and information needs;

▶ focus on services; and

▶ building ownership, collaboration and commitment.

These practices have been included within the CRGIS Plan.

SECTION 6

VISION, MISSION AND GUIDING PRINCIPLES

Vision

The vision for the Capital Region Geographic Information Services is:

> "A shared regional geographic information service that provides equitable access and support for regional decision making."

Mission

The mission for the Capital Region Geographic Information Services is:

> "To expand regional capacity to deliver regional geographic information services that support sustainable land use, intermunicipal transit and social and market affordable housing decisions through the collaboration of the Capital Region Board and the Capital Region municipalities."

Guiding Principles

The Capital Region Municipalities will realize this vision through these guiding principles:

> **Autonomy** – All municipal members will respect the self determinations of other municipalities and their control over land use planning within the context of the regional plan.

> **Collaboration** – All municipal members will work together to support the planning efforts of the region.

> **Equity** – All municipal members will be treated in a way that is equitable, consistent and congruent.

> **Flexibility** – All municipal members will be expected to identify options that work best for themselves while also fitting in with the needs of the region.

▶ **Mutuality** – Working together in the region will be the key to achieving the economic objectives of any of the member municipalities.

▶ **Sustainability** – All municipalities' members will seek decisions which encourage sustainable communities.

▶ **Transparency** – The results of decision making processes will be transparent to stakeholders.

The vision, mission and guiding principles are consistent with the objectives of the Capital Region Growth Plan strategy.

Strategic Goals

Four strategic goals were identified to support the achievement of the vision(Figure 4). The goals are:

I. Governance –establish the governance structure required to optimize the benefits from CRB geographical information resources.

II. Data –ensure the capture, preservation and maintenance of foundational (priority) data sets, and set guidelines for non-foundational data.
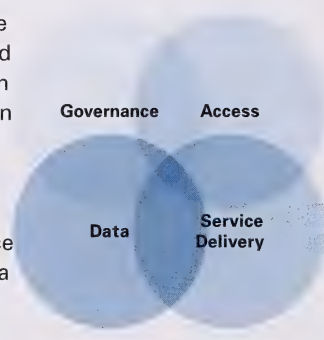
III. Access –ensure that geographical information can be readily accessed while ensuring that appropriate security is in place to protect information.

IV. Service Delivery –ensure that the service delivery model is cost effective, and balances the needs of the municipalities with the needs of CRB.

Figure 4: Strategic Goals

1. Governance – Establish the governance structure required to optimize the benefits from CRB geographical information resources.

Governance is required to ensure that the appropriate investments, based on available funding, can be recommended to the CRB.

There is a need for a strong central coordinating approach to drive the other three strategic goals (Data, Access and Service Delivery) and ensure effective participation in decision making by regional municipalities. An appropriate governance model with good leadership and support is needed for the development of quality prioritized data strategies, access initiatives, and appropriate services. Leadership and sustained coordination are essential to maintain the momentum for any project.

It is also vital to communicate the implementation of the Strategy, so that municipalities and individuals are able to contribute to the various strategic goals and initiatives. Given the scarcity of geographical information capability and capacity within some municipalities in the Capital Region, an education/promotion role is also an important part of any governance arrangement.

2. **Data** – Ensure the capture, preservation and maintenance of foundational (priority) data sets, and set guidelines for additional data creation, sharing and analysis.

The CRB and regional municipalities must acknowledge that certain geographical data sets are critical to the effectiveness of the Capital Region. Identifying data priorities is a key aspect of the effective management of data resources. Issues such as transit oriented development, environmentally sustainable land use planning, and regional economic development demand higher quality, and sometimes new types of regional data sets and services.

Creating foundational data sets (e.g. roads, municipal boundaries and rivers) will be essential before other priority regional data sets (e.g. land use, housing) can be put in context.

As well as identifying and prioritizing the development and management of foundational data sets, there is a need to address data set stewardship and the funding of data capture, preservation and maintenance programs, products and services. Similarly there is a need to provide guidance on best practice around the management of non-foundational data sets as these make up a large proportion of the geographical information assets.

3. **Access** – Ensure that geographical information can be readily accessed while ensuring that appropriate security is in place to protect information.

This strategic goal will focus on promoting greater use of geographical information by the CRB and municipalities. This will help build greater awareness of, and support for, improved data management, including the application of common standards.

A key component of the Strategy focuses on taking a structured approach to the discovery of, and access (including security) to, both foundational and non-foundational regional data sets. Access arrangements should be geared to maximize the ability to discover, access and use the geographical information resources. The access arrangements implemented will need to make explicit any constraints on use (privacy constraints, licenses, distribution, costs etc).

4. **Service Delivery** – Ensure that the service delivery model is cost effective and balances the needs of individual municipalities with the needs of CRB.

The services required to support regional decisions by the CRB will in some cases be different than the services required by individual municipalities within the Capital Region. Individual municipalities will continue to need GIS locally to support a broad set of municipal needs and specific municipal data. The CRB will focus on regional data and information with supporting services.

The CRB will need to develop a funding model that is fair and equitable to those that require the service and those that don't. Some municipalities will be in a position to perform services in support of the regional needs while others do not yet have the capacity nor capability for supporting CRGIS services and data requirements.

SECTION 7

CRGIS PLAN

The Capital Region needs to prepare, gather and analyze a wide set of data and information to ensure evidence based decisions can be made.

Strategy

The strategy is to develop the people, processes, technology and data needed for the CRGIS. The CRB will be responsible for the coordination and delivery of the services and will provide the quality assurance necessary for access and use of regional information.

The success of this plan will be assured through the implementation of a governance model that ensures:

- the right investments and pace of development of the CRGIS occur to meet priority needs;
- development of a comprehensive regional information and data creation plan that can evolve to support changing business needs;
- services are developed to support planning and implementation of policies for land use, intermunicipal transit and social and market affordable housing;
- municipalities have shared access to regional data and tools to enable a comprehensive regional view or picture; and
- sharing of information and knowledge across the Capital Region.

The strategic framework shows the relationship between the business priorities and the development of protocols, methods and standards for the CRGIS (Figure 5).

Figure 5: CRGIS Plan Strategic Framework

Stakeholders

The stakeholders of a CRGIS were determined by the GIS Working Committee. The initial stakeholders for a CRGIS will be the CRB and municipalities within the Region. In time, it is expected that the CRGIS will continue to evolve and be accessible by other levels of government, the public, academia and industry.

Business Model

During development of the plan, consultation with stakeholders revealed several potential models for delivery of the CRGIS. The models considered viable include:

- an existing municipality provide the service;
- a third party provide the service (for a fee);
- a public private partnership with one or more other entities; and
- the services provided through the CRB.

The recommendation from the GIS Working Committee concluded that the CRB was the optimal business model.

This business model was selected to:

- best align with the CRB Growth Plan objectives for an integrated and strategic approach for the coordination of regional decisions in the Capital Region;
- enable a focus on supporting regional issues and context, of interest including land use, regional transit and social and market affordable housing;
- leverage the existing CRB governance model;
- ensure control over regional priorities;
- allow the CRB to build and retain intellectual capital;
- enable objective analysis of the information;
- enable access to geographic information services for all participating municipalities;
- ensure ongoing engagement by regional stakeholders for the ongoing evolution of the services;
- focus on building a complementary set of services to what municipalities already have, and does not replace existing GIS investments;
- enable autonomy in the service provider; and
- address the sense of urgency for providing the "regional picture".

As identified earlier, CRB approved the business model which established the context whereby services would be coordinated through the CRB. Of equal importance is the service delivery model that answers the question of which people, technology and process will be employed for the CRGIS.

Service Delivery Options

The service delivery options are:

▶ acquire necessary resources to provide all services through the CRB administration;

▶ outsource the services to a contracted provider;

▶ contract services through a single existing municipal GIS office (e.g. City of Edmonton);

▶ contract services through a combination of services provided by multiple existing GIS offices (e.g. City of St. Albert and City of Leduc); and

▶ a combination of the above;

This plan has not identified the specific service delivery option. The choice of the service delivery option will require investigation and a business case prior to presentation to the CRB for a decision.

Generic Service Delivery Model

The generic model is described in the following model (Figure 6):
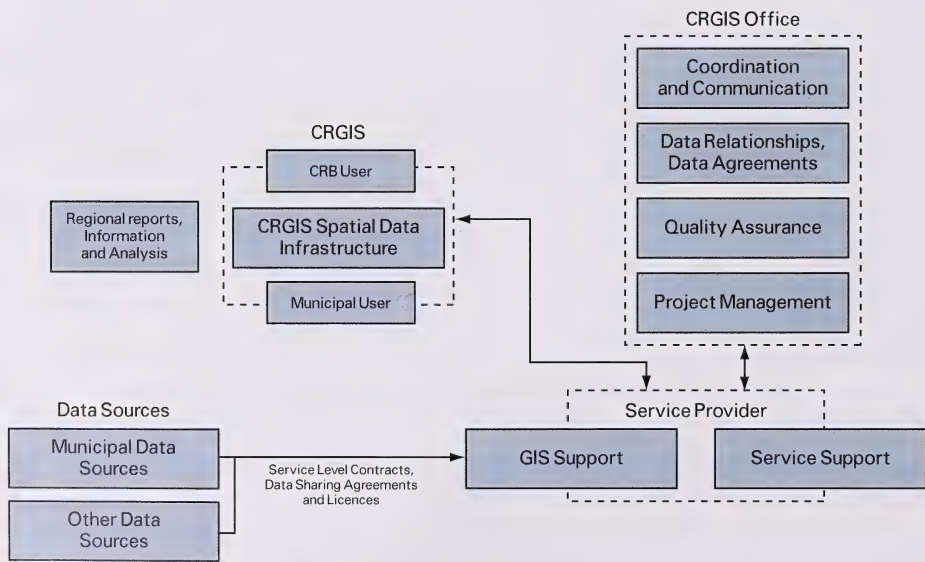
Figure 6: Generic Service Delivery Model

Desired Future State

To meet the needs of the Capital Region, the future state envisions more than just a data repository and data sharing mechanism. The desired future state will ensure the capacity and capability to provide geographic information services necessary to support regional decision making.

It is expected that the implementation of the regional plans will require extensive information not just about land use, transit and housing but information and data about the environment including the cumulative effects of development and the social consequences of regional decisions.

Consultation with the Capital Region's municipal representatives resulted in defining the type of regional GIS and direction of the CRGIS.

▶ The regional GIS should be developed based on the following:
- effective governance in place;
- web-based GIS application;
- access by all municipalities, not just those with a GIS;
- provides a regional view or picture;
- ensures data and information security;
- establish appropriate data licensing;
- supports data sharing; and
- allows regional analysis, modeling and scenario development.

▶ The regional GIS should provide the following services:
- coordination through the CRB;
- regional data gathering (i.e. compiling local or other data sets into regional ones), maintenance (i.e. maintaining and updating the regional data set from local or other data sets) and sharing - compiling local data into regional data sets;
- regional report development and information sharing;
- regional information analysis;
- operation of a regional system and office;
- education and capacity development for use of regional GIS data and information;
- alignment with the land use, transit and housing implementation plans; and
- monitoring and accountability of the CRGIS and support for the Integrated Growth Plan.

What is Governance?

Hodges et al[1] define governance as:

> "... the procedures associated with the decision making, performance and control of organizations, with providing structures to give overall direction to the organization and to satisfy expectations of accountability to those outside it."[2]

Governance helps answer several questions including:

> What decisions must be made to ensure appropriate management and use of the CRGIS?
> Who should make these decisions?
> How will these decisions be made and monitored?

Why is Governance Important?

The success of this plan will be assured through the implementation of a governance model that:

> ensures the right investments and pace of building the CRGIS occurs to meet priority needs;
> establishes a comprehensive information and data plan which will evolve to support changing business needs and provides services to support planning and implementation of policies for land use, intermunicipal transit and social and market affordable housing; and
> produces a CRGIS that provides municipalities with shared access to regional data and information to enable a comprehensive regional view or picture to support the impact analysis and assessment including sharing of knowledge across the Capital Region.

Regional Governance

The Working Together Report identified the issues and a model for regional governance. Under the adopted regional governance model for the CRB:

> "...all functions and services over which the Board has a mandate should be regarded as regional in scope. All municipalities should be required to participate in the functions and services, and the decisions of the Board should have effect over all its members.
>
> Where an issue involves only two municipalities and there is no impact beyond the borders of those two municipalities, the matter would be considered sub regional and dealt with on a sub regional basis. Municipalities can continue to pursue matters of sub regional interest beyond the mandate of the Board on their own, by establishing intermunicipal agreements."[3]

The proposed governance model for CRGIS needs to be consistent with this model. This document proposes a governance arrangement for intermunicipal cooperation to support the implementation and ongoing operation of the CRGIS.

1 Corporate governance in the public services: issues and concepts an article published in Public Money and Management 16 (2) 7-13
2 http://makingendsmeet.idea.gov.uk/idk/core/page.do?pageId=5148966
3 Working Together Report, December 2007

CRGIS Governance Model

The CRGIS must be approached as an investment in the data, process, people and technology that serve the Capital Region. Accomplishing this requires a complementary governance model that supports dedicated regional resources to coordinate gathering data and information from a variety of municipal and non municipal sources.

The following diagram provides an overview of the proposed governance model for CRGIS within the Capital Region (Figure 7).
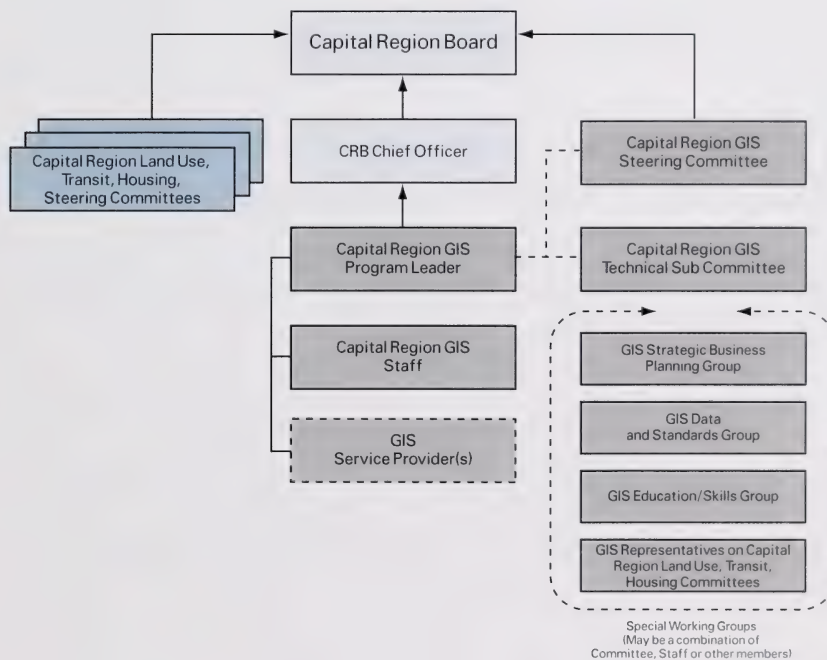
Figure 7: Governance Model

This section of the plan provides a preliminary set of roles & responsibilities for each of the different groups identified.

The Capital Region Board (as it relates to GIS)

A purpose of the Board is to receive and review recommendations from the CRGIS Steering Committee. The Board performs several functions that are critical to the success of the CRGIS. Its role is to:

- determine and prioritize the regional needs and interests to be served by the CRGIS (e.g. land use, transit, affordable housing);
- ensure that GIS decisions support regional interests and are aligned with regional priorities; and
- receive, review and where appropriate approve recommendations, including funding requests, from the CRGIS Steering Committee.

CRGIS Steering Committee

The CRGIS Steering Committee membership is a subset (6-8 members) of the CRB. The Steering Committee's purpose is to effectively guide the implementation of the GIS Plan and operation of the CRGIS. Functions performed include:

- determine and recommend to the CRB, the appropriate mechanisms, policies and priorities for development and implementation of the CRGIS;
- oversee the development of annual CRGIS Business Plan (which sets the direction for the CRGIS in support of the Board's work);
- make recommendations for the budget to CRB (both capital and operating);
- oversee implementation of CRGIS projects (including policies, standards, applications, services) as approved by the CRB; and
- ensure an effective means of communication between the CRB, the Committee, Regional Staff, the Technical Sub Committee and any Special Working Groups and member municipalities.

Technical Sub Committee

The Technical Sub Committee (6-8 members) will report to and advise the Steering Committee on matters concerning data access, data content, policy, standards, applications and other areas as may be identified.

The Technical Sub Committee will initially be comprised of select technical and business area resources from the municipalities in the Capital Region. These resources will be recommended by their respective municipalities and approved by the GIS Steering Committee. Once the business priorities are established by the CRB, this group may be expanded to include resources from other stakeholders (e.g. the Provincial Government, private companies and technology vendors). The tasks and responsibilities of the team shall be determined by the Steering Committee. The team shall have the following duties:

> present the Steering Committee with plans, studies, and recommendations for action that address each of its tasks as assigned by the Steering Committee;
> remain current and discuss new trends regarding GIS technology and related capabilities as they relate to the CRGIS community;
> foster information sharing related to GIS technology; and
> review technical issues raised by the Steering Committee, Special Working Groups and regional staff.

Special Working Groups

The purpose of the Special Working Groups will be small groups (3-4 members) focused on specific technical and business issues. These groups will initially include the following:

> strategic and business planning including policy and budget;
> data and standards including protocols and methods;
> technology and standards including protocols and methods;
> education and skills development; and
> representatives approved as participants or observers on Regional Committees representing land use, transit and housing.

The Special Working Groups will initially be comprised of members of the Steering Committee, members of the Technical Sub Committee, members of the regional GIS staff or other members identified by the CRB. The Special Working Groups will advise the Steering Committee, GIS Program Leader and Technical Sub Committee on functional matters.

The tasks and responsibilities of the groups shall be determined by the Steering Committee or the Technical Sub Committee sponsoring the Special Working Groups. The groups shall have the following general duties:

▶ complete research and development;

▶ prepare input and analysis (e.g. business cases);

▶ develop specific action plans for major activities;

▶ prepare plans, studies and recommendations;

▶ remain current and discuss issues regarding land use, transit and affordable housing information needs;

▶ foster information sharing related to functional issues; and

▶ review issues referred by the Steering Committee, Technical Sub Committee and regional GIS staff.

Regional GIS Staff

The CRGIS Staff will be responsible for coordination of the CRGIS and ensuring delivery of projects and responsibilities approved by the Steering Committee. A Capital Region GIS Program Leader will be responsible for GIS staff including service providers that may be contracted. The GIS Program Leader will report to the CRB Chief Officer.

The GIS Program Leader and GIS staff shall have the following responsibilities:

▶ develop the annual Business Plan and Budget for approval by the Steering Committee;

▶ manage and deliver projects as approved by the Steering Committee and the CRB;

▶ advise the Steering Committee and the Technical Sub Committee on matters concerning the design, implementation and operations of the CRGIS including regional data sets/solutions, standards and/or guidelines that facilitate data sharing, data delivery and access procedures; and

▶ coordinate the work of the Technical Sub Committee and the Special Working Groups.

Other regional GIS staff may include service providers, contractors, and secondments from municipalities or volunteers.

SECTION 8

IMPLEMENTATION OF THE PLAN

There is a need to build a foundation including funding initial data gathering, identifying data stewardship and ensuring the sustainability or maintenance of quality regional data.

Phases of the Plan

The implementation of the CRGIS is divided into three phases:

▸ Phase 1 - Build the Foundation

The total upfront cost for this phase is estimated at $1.5 million.

The results of this phase will provide a solid foundation for building the CRGIS. Data sharing agreements will be in place, technology decisions will be made and a CRGIS office will provide support to the CRB and municipalities.

▸ Phase 2 - Build the Decision Making Capacity

The total upfront cost for this phase is estimated at $2.5 million.

The results of this phase will provide a functioning CRGIS (e.g. a regional system with regional data) that supports specific regional needs for land use, intermunicipal transit and social and market affordable housing decision making.

▸ Phase 3 - Build Sustainable Value

The total upfront cost for this phase is estimated at $7 million.

The results of this phase will provide a sustainable CRGIS that contributes to evidence based decisions and longer term value for the Capital Region.

Initial Resources

Based on the preceding phases and subject to necessary funding it is expected that the CRB will immediately invest in people, technology, data and processes for the CRGIS.

The initial resource requirements will include:
▶ CRGIS Staffing Coordinator / Project Manager
▶ CRGIS Subject Matter Expert
▶ Administration support
▶ Establishment of the CRGIS office
▶ Investment in initial hardware, software and networking

The initial resource requirements and ongoing costs for a five-year time frame are included in the estimated costs for each phase described above. Funding for the three phases of the CRGIS Plan will be required from the Government of Alberta.

Future Initiatives

Future GIS initiatives and on-going commitments including comprehensive data gathering and maintenance will generate additional costs. Future initiatives may include:
▶ development of public, academic and industry access to the CRGIS;
▶ development of region wide land use, transit and housing planning web based tools for public needs;
▶ development of a formative and summative evaluation for the first five years of the CRGIS;
▶ identification of broader application of the CRGIS to include infrastructure management, emergency management and economic development; and
▶ development of a 10-year plan for the CRGIS.

Strategic Goals and Project Phases

The following summarizes the implementation plan across three phases based on the strategic goal. CRB will approve the specific investments and pace of implementation (Table 2).

Strategic Goal	Phase 1 - Build the Foundation	Phase 2 - Build the Decision Making Capacity	Phase 3 - Build Sustainable Value
Governance			
Prepare and implement CRGIS governance structure			
Conduct awareness and education sessions			
Prepare or modify a business plan			
Measure and report			
Data			
Inventory data and systems in the region			
Identify land use, transit and housing business, information and data needs			
Develop the regional data model, metadata and data dictionary			
Develop standard terminology for the CRGIS			
Establish preliminary data standards, methods and protocols			
Identify data gathering projects for priority regional information needs			
Implement data gathering projects			
Identify data creation projects for priority regional information needs			
Implement data creation projects			
Access			
Develop and implement regional data sharing agreements			
Make decision on technology direction			
Implement technology (dependent upon service delivery model)			
Prepare functional design for CRGIS			
Build the CRGIS			
Enhance CRGIS to include modeling applications			
Service Delivery			
Evaluate service delivery alternatives			
Develop service delivery business case			
Implement service delivery model			
Implement service support services			
Implement analysis and modeling support			
Enhance service delivery			

Table 2: CRGIS Implementation Phases

Detailed Description of the Phases

Each of the phases includes strategies reflecting foundational, data and analysis projects. These projects are intended to enable achievement of the four strategic goals – governance, data, and access and service delivery.

The following describes each phase:

Phase 1 – Build the Foundation

▶ Contribute to awareness and education
- develop communication and awareness building sessions/mechanisms; and
- generate appropriate public engagement.

▶ Finalize and implement the recommended governance model to support the CRGIS:
- establish the CRGIS office;
- recruit / hire a GIS Program Leader; and
- identify and secure resources (e.g. staff) to support services.

▶ Develop and implement a prioritization and approval process for CRGIS projects
▶ Review the land use, intermunicipal transit and social and market affordable housing regional plans for specific business, information and data needs (Appendix B)
▶ Inventory the specific business and information terminology (e.g. land use districts, zoning)
▶ Establish regional attribute and symbology standards for data relating to themes that are of specific, region wide interest including:
- land use developed through the Land Use Committee;
- transit developed through the Intermunicipal Transit Committee; and
- housing through the Social and Market Affordable Housing Committee.

▶ Complete a detailed assessment and inventory of GIS and geospatial data sets identified as required for the regional view or to meet regional needs (Appendix C).
▶ Identify service delivery partners and options.
▶ Develop the service delivery model.
▶ Build the business case including cost benefit analysis for a service delivery model

- Prepare a business plan with service delivery and operating models that includes:
  - Operating and capital requirements such as:
    - people;
    - technology;
    - services (processes); and
    - data.
- Implement the service delivery model
- Develop and implement "Regional Data Sharing Agreements"
- Immediately acquire available data from municipalities, identify data which can be provided through non-municipal data providers and share where appropriate
- Develop the metadata and data dictionary (including standards)
- Develop the business requirements for data and technology for the CRGIS
- Subject to the service delivery model, develop system architecture and make a decision on a technology direction (including protocols)
- Subject to the service delivery model, develop the regional data model
- Develop and implement the protocols and methods for data including (Appendix D):
  - collecting and storing;
  - compiling and analyzing; and
  - sharing and distributing.

The results of this phase will be a solid foundation for building the CRGIS and the capacity for decision making and monitoring the implementation of the regional plans.

Phase 2 — Build the Decision Making Capacity

- Measure and report on the results of the Phase 1 implementation:
  - monitor and report on financial accountability;
  - monitor and ensure compliance with governance; and
  - provide progress reporting to the CRB.
- Develop infrastructure to support services
- Develop a capacity development program that includes training
- Create a simple data catalogue or inventory:
  - provide the ability to obtain data for self defined geographic areas of interest (i.e. clip);
  - ensure the ability to select among available geographic data sets and attributes; and
  - develop an online data finder for centralized or distributed data.

- ▶ Implement the metadata and data dictionary (including standards)
- ▶ Initiate further data gathering (i.e. compilation) for targeted business needs
- ▶ Prepare a functional design for the CRGIS
- ▶ Develop the procurement mechanisms for data gathering, service support help desk and system development
- ▶ Subject to the service delivery model, build or acquire services for a regional system that provides a data repository and access for viewing and/or using data and the regional view
- ▶ Develop and implement standards for mapping capabilities.

The results of this phase will be a functioning CRGIS that supports specific regional needs for land use, intermunicipal transit and social and market affordable housing.

Phase 3 — Build Sustainable Value

- ▶ Measure and report on the results of the Phase 2 implementation
  - Measure the satisfaction of Phase 2 decision making and analysis
  - Monitor and report on financial accountability
  - Monitor and ensure compliance with governance
  - Provide progress reporting to the CRB

- ▶ Develop and implement region wide practices for data backup, recovery and archiving
- ▶ Subject to the service delivery model, enhance or acquire services for a regional system for optimizing data sharing and management of data
- ▶ Enhance the CRGIS technology including integration, interfacing or information sharing with other priority business applications
- ▶ Conduct further data gathering and regional data creation projects for regional information needs
- ▶ Ensure interoperability of regional data with other analysis, financial and modeling applications
- ▶ Secure sustainable funding for broad implementation of CRGIS
- ▶ Optimize ongoing operations, data maintenance and CRGIS processes
- ▶ Extend partnerships and involvement of other stakeholders and interested business areas, subject to existing constraints and partnership agreements

The results of this phase will include greater integration with other related information and technology within the Capital Region.

SECTION 9
CRITICAL SUCCESS FACTORS AND RISKS

Critical Success Factors

Four critical success factors have been identified from literature, best practice review and consultation with stakeholders for a CRGIS:

Critical Success Factor	Rationale
Secure and allocate sufficient financial and human resources	The successful implementation of the CRGIS will require both financial and human resources.
	The estimated cost for the first three phases is $11 million. Securing this initial investment from the Provincial Government is critical. However, long term sustainable funding, to cover ongoing costs, is necessary.
	Human resources are required to ensure the implementation of the CRGIS. This includes both CRGIS staff, staff from participating municipalities and potential service contractors.
Educate and train stakeholders	The current level of understanding of what the CRGIS is, why is it needed and what it will take to implement varies considerably among stakeholders.
	Continued reinforcement of key messages (e.g. the CRGIS will not compete, replace or duplicate what is already in place within municipalities) through ongoing communication and education is critical to ensure that expectations are aligned.
	Training on the CRGIS will increase regional capacity and expand capabilities within municipalities.

Critical Success Factor	Rationale
Focus on foundational elements first	The CRGIS must be built on a solid foundation. The implementation plan identifies the key foundational elements. Incremental steps, based on clear business and information needs, and well-defined priorities, are critical to ensuring long term success.
Demonstrate CRGIS contribution to tangible benefits	Describing the potential benefits of the CRGIS is difficult in the absence of "hard numbers" to support the claims. Demonstrating the benefits (e.g. better land use or transit decisions that result in cost or time savings) will significantly increase the buy in of stakeholders. Understanding the potential impact of a decision, before the decision is made, may help municipalities better align their decisions with regional goals.

Risks

Three types of risks – political, economic and operational - have been identified by stakeholders regarding the CRGIS.

Risks	Mitigation
Political - Inability of CRB to agree on the CRGIS or the CRGIS Plan	By approving the CRGIS Plan, the CRB can demonstrate to the Government of Alberta and each other their commitment to moving forward with a CRGIS.
Political - Municipal elections result in change in CRB representatives	Implement the CRB approved governance model which includes staff positions to ensure continuity.
Economic – Inability to secure initial and long term funding	Present the CRGIS Plan within the Capital Region Integrated Growth Plan to the Government of Alberta and seek funding support for initial and ongoing funding. Identify resource contributions that municipalities in the Capital Region may be prepared to provide or budget for in their business plans.

Risks	Mitigation
Economic - Companies look outside the region to establish their businesses due to a lack of regional information about land use, transit, housing, infrastructure and the environment	Implement the CRGIS Plan as a component of the Capital Region Growth Plan and review the CRGIS Plan on an annual basis. Consider future initiatives for the CRGIS that optimize development and prioritization of enhancements to the CRGIS that support industry and business stakeholders.
Economic – Inability of CRB to implement the approved cost allocation model for GIS	Using the cost allocation model for the CRB, engage the CRGIS Steering Committee to identify the implementation of the cost allocation model considering the previous investments in GIS and geospatial data made by some municipalities and the constraints by other municipalities.
Operational – Inability to retain and build commitment and participation and contributions from municipalities	Actively champion the CRGIS Plan through the CRB. Develop appropriate awareness and education campaigns for elected officials.
Operational – Inability to solve data sharing and licensing requirements given existing agreements between municipalities and their data providers	Prioritize data sharing agreement development including appropriate review with legal counsel. Have the CRGIS work with data providers toward common data sharing agreements. Use the CRGIS Steering Committee to mediate issues for recommendation to the CRB.
Operational – Inability to gather region wide data for specific business needs due to costs, time and resources	Establish a Special Working Group to immediately lead a detailed assessment of data availability, data needs and a plan for data creation and acquisition based on priority business needs. Develop collaborative relations with the provincial and federal governments for optimized access, licensing and use of data.

SECTION 10

RECOMMENDATIONS

The strategic direction for the CRGIS Plan has been set by the CRB. During the development of the CRGIS Plan the GIS Working Committee prepared several recommendations framing a CRGIS for the CRB.

The CRB has approved the following recommendations of the GIS Working Committee:

▶ Endorsement of the principle to share GIS data between member municipalities to support the commitment to effective regional planning, respecting legislative and legal requirements.
▶ Acceptance of the CRGIS vision, mission and guiding principles.
▶ Acceptance of a business model whereby the CRGIS is delivered through the Capital Region Board.

In addition the GIS Working Committee and the Technical Sub Committee recommend the following:

▶ Adoption of the Capital Region GIS Strategy and Implementation Plan
▶ Adoption of the Governance Model for the Capital Region GIS

The key recommendation encompassing the above recommendations was provided to the CRB on January 15, 2009 as the following draft motion:

   "That the Capital Region Board approves the Capital Region GIS Plan".

As stated by the Interim Chair for the Capital Region Board, the approval by the CRB of the plan does not mean approval by the CRB of the implementation.

SECTION 11
BENEFITS

The main benefit of the CRGIS is the ability for the CRB and municipalities to make more effective decisions of regional priority.

The CRGIS will enable the CRB and municipalities to measure cumulative impacts of interrelated decisions to ensure sustainability (e.g. economic, environmental and social) and at the same time improve the results from more effective land use, intermunicipal transit network development and social and market affordable housing investments.

Other benefits identified for the CRB and municipalities include:
- more effective global marketing of economic opportunities in the Capital Region. Site locators prefer to target an entire metropolitan area rather than a multitude of individual jurisdictions;
- smaller municipalities may gain affordable access to a previously unaffordable information system;
- efficiencies of data and information sharing;
- effectiveness of the use of that information across the region and for decision making and policy development:
    - manage business processes, particularly of regional context, in a more flexible manner;
    - reduce cycle times to respond more quickly by optimizing information about location; and
    - develop ways to add value for Albertans in the Capital Region.

- improved coordination and cooperation in planning for growth; and
- economic, environmental and social sustainability.

Consequently, these benefits will lead to improved quality of life for Albertans:
- Albertans in the Capital Region will benefit from better planning decisions; and
- Albertans in the Capital Region will benefit from managed growth.

SECTION 12
SUMMARY

Better information makes for better decisions. Regional planning decisions require regional data and regional information. It is believed that this plan will result in a regional GIS that will enable evidence based decisions in the Capital Region on matters of regional priority.

The strategy for the CRGIS includes:
▸ a vision, mission and guiding principles;
▸ strategic goals for governance, data, access and service delivery; and
▸ a CRGIS office, with a regional system providing regional views.

The implementation plan for the CRGIS includes three phases:
▸ Phase 1 - Build the Foundation
▸ Phase 2 - Build the Decision Making Capacity
▸ Phase 3 - Build Sustainable Value

The expected cost for the three phases is in the order of $11 million.

Improved coordination of land use planning, intermunicipal transit planning and ensuring a diverse range of social and market affordable housing exists to meet all income levels mean a more sustainable and livable region in future.

Ultimately, Albertans, businesses and visitors to the Region will benefit from the CRGIS and the decisions of regional leaders.

SECTION 13
APPENDIX A: CONTRIBUTION

Many individuals, groups and organizations have contributed to this report. The following identifies key contributors however many other contributions were made.

GIS Working Committee

Name	Role, Organization
Greg Krischke, Chair	Mayor, City of Leduc
Nolan Crouse, Vice Chair	Mayor, City of St. Albert
Anita Fisher	Mayor, Town of Devon
Ken Lemke	Mayor, Town of Stony Plain
Donald Rigney	Mayor, Sturgeon County (represented by Councillor Karen Shaw)
Carrie Fischer	Councillor, Town of Redwater
Art Erickson	Councillor, Village of Wabamum
Sharon Shuya	Manager, Regional Projects, Capital Region Board

Technical Sub Committee

Name	Role, Organization
Art Erickson, Chair	Councillor, Village of Wabamum
Wendy Ritchie	Director GeoEdmonton, City of Edmonton
Bart Pouteau	Manager, Geomatics Services, City of Leduc
Tammy Kobliuk	GIS Coordinator, Corporate GIS, City of St. Albert
Daren Sears	Coordinator, GIS - IT Services, Strathcona County
Kevin Smiley	GIS Coordinator, Sturgeon County
Charles Lendzion	GIS/IT Coordinator, Town of Stony Plain
Jon Schmuland	Supervisor, Information Systems, Parkland County
Steve Lepp	GIS Coordinator, Leduc County
Carl Stewart	GIS Analyst, City of Fort Saskatchewan
David Dubauskas	Chief Administrative Officer, City of Fort Saskatchewan
Sharon Shuya	Manager, Regional Projects, Capital Region Board

Governance Sub Committee

Name	Role, Organization
Anita Fisher, Chair	Mayor, Town of Devon
Carrie Fischer	Councillor, Town of Redwater
Sharon Shuya	Manager, Regional Projects, Capital Region Board

Project Team

Name	Role, Organization
Ed Marchak, Project Manager	Director, PricewaterhouseCoopers LLP
Barry Huybens, Senior Consultant	President, iStrategic Advisors Inc.
Sharon Shuya	Manager, Regional Projects, Capital Region Board

Other Key Contributors

Type
Mayors and Reeves
Municipal Chief Administrative Officers, City Managers, Commissioners
Municipal Planners
Municipal GIS Representatives
North American Regional GIS Experts
Capital Region Board staff

A thank you to Ben Van De Walle (Councillor, Town of Morinville) for his support.

Additionally, we acknowledge Chris Sheard (Interim Chair, Capital Region Board) and Kathleen LeClair (Chief Officer, Capital Region Board) for their guidance and support.

SECTION 14
APPENDIX B: INFORMATION NEEDS

Information Needs from CRB Regulations

The following information needs[4] were identified within the CRB Regulations:

Need	Priority Area		
	Land use	Transit	Housing
Population and employment projections	✓		
Identification of priority growth areas, land supply (for residential, commercial and industrial purposes), agricultural lands, buffer areas, density of development, development and location of infrastructure	✓		
Corridors for recreation, transportation, utilities and intermunicipal transit	✓		
Policies regarding environmentally sensitive areas	✓		
Policies for coordination of planning and development	✓		
Provisions for social transit services for people with disabilities		✓	
Provisions for reviewing and monitoring the regional intermunicipal transit network		✓	
General location of housing			✓

4 Note: Shaded cells represent the information needs for the business priority area.

Information Needs from Consultation

The following needs were identified broadly through consultation with stakeholders:

Need	Priority Area		
	Land use	Transit	Housing
The boundaries and characteristics of a specified jurisdiction	✓	✓	✓
The land use or development plans	✓	✓	✓
The locations and characteristics of water features	✓	✓	✓
The type and location of municipal infrastructure	✓	✓	✓
How a piece of land is being used, including whether or not it is vacant	✓	✓	✓
Where people live and the type of housing needs	✓	✓	✓
A unique identifying attribute of a land parcel	✓	✓	✓
The locations and characteristics of roads	✓	✓	✓

APPENDIX C: DATA LAYERS

This appendix describes various data layers identified during preliminary consultation in the development of the CRGIS Plan. It is anticipated that further investigation and assessment as identified in the implementation plan will result in specific requirements and priorities.

The specific data layer name and descriptions have not been determined.

For each identified data layer it is anticipated that specific variations (e.g. historical versus current, municipal versus regional, arterial road versus local collector) of the data will need to be defined for certain business applications or analysis requirements.

Essential Data Layers

Further to consultation with stakeholders various data layers were identified as being necessary to establish a base or framework for a "regional picture" or view. The following data layers are considered essential for the entire Region:

Need	Priority Area		
	Land use	Transit	Housing
Cadastral base	✓	✓	✓
Ortho-photography	✓	✓	✓
Municipal boundary	✓	✓	✓
Regional boundary	✓	✓	✓
Hydrology (e.g. water bodies, rivers, streams)	✓	✓	✓
Topography or Contours	✓	✓	✓
Highways and local streets	✓	✓	✓

Other data would then be layered onto this base.

While the above layers are considered essential, it is anticipated that not every layer will be immediately available for all municipalities across the region or in a common standard. The specific data standards including scale, format and resolution have not been determined at this point.

Stakeholders proposed that base data should be sought for the entire Region while other highly desirable data may only need to be gathered or collected based on regional priorities or areas within the Region for which decisions need to be made.

Needed Data Layers

The following data layers are considered highly desirable for the entire Region:

Need	Priority Area		
	Land use	Transit	Housing
Socio-economic data	✓	✓	✓
Census data	✓	✓	✓
First Nation location and boundary	✓	✓	✓
Metis settlement and boundary	✓	✓	✓
Water system infrastructure	✓	✓	✓
Waste system infrastructure	✓	✓	✓
Oil and gas utilities and systems	✓	✓	✓
Power and electrical utilities and systems	✓	✓	✓
Parks and protected areas	✓	✓	✓
Crown reservations	✓	✓	✓
Population forecasts	✓	✓	✓
Population densities	✓	✓	✓
Transportation corridors	✓	✓	✓
Utility corridors	✓	✓	✓

The specific priority areas for these data layers have not been validated.

The following data layers are considered highly desirable for the entire Region based on the priority area:

Need	Priority Area		
	Land use	Transit	Housing
Master development plans	✓		
Future and existing land use	✓		
Future and existing land zones	✓		
Future and existing residential	✓		
Future and existing commercial	✓		
Future and existing industry	✓		
Future and existing agricultural	✓		
Floodplains	✓		
Recreational lands	✓		
Bus locations		✓	
Light rapid transit		✓	
Park and ride locations		✓	
Passenger count data		✓	
Traffic count data		✓	
Roadway speed/zones		✓	
Roadway direction		✓	
Roadway capacity		✓	
Railways		✓	
Intersections		✓	
Airports		✓	
Passenger forecasting model		✓	
Traffic forecasting model		✓	
Walkways		✓	
Housing types			✓
Housing needs data			✓

Supplemental Data Layers

These data layers are a small sample of data identified by various stakeholders as having a potential benefit for the regional view and toward meeting requirements of priority areas.

The following data layers are considered desirable for the Region or specific regional area:

- Watersheds
- Airsheds
- Wetlands
- Cumulative effects data
- Sub-surface water
- Soils
- Geology
- Health facilities
- Emergency services locations
- Biodiversity data
- Points of interest
- Retail facilities

SECTION 16

APPENDIX D: PROTOCOLS, METHODS AND STANDARDS

Protocols

Type	Description
Data sharing	• Municipalities endorse the principle to share GIS data between member municipalities to support the commitment to effective regional planning respecting legislative and legal requirements.
Terminology	• Each business priority area (e.g. land use, transit and housing) will be responsible through the respective planning committees for definition of specific terms and codes (e.g. land zoning). The committees will provide that terminology to the CRGIS secretariat.
Municipal data provided to the CRB	• Municipalities shall provide approved data for inclusion into regional data sets on a timely basis, where available.
	• When a municipality submits data to the CRB, it should provide metadata or a description of the data.
	• All local data layers provided by a municipality will continue to be maintained at source by the municipality or the data provider.
	• Once data standards or common formats are approved, data must be submitted in the approved format and with the approved metadata standard.

Protocols

Type	Description
Municipal data shared between municipalities in the region	• Local data will be shared between municipalities in as simple a process as possible.
	• Sharing of local data between municipalities may be completed at the sole discretion of municipalities.
	• Municipalities cannot redistribute another municipality's data without specific permission from the CRB or the member owning the data.
	• If a municipality discovers an error or omission in another municipality's data or updates that member's data, the user is obliged to notify the data owner and provide the owner with copies of any improvements to the data. The original data owner can then decide whether to update its data set.
	• Once data standards or common formats are approved, data must be submitted in the approved format and with the approved metadata standard.
Regional data	• All regional data layers created by the CRB will be maintained by the CRB or its service provider.
	• All municipalities wishing to access and use regional data sets prepared by the CRB will comply with required data sharing and licensing agreements.
	• Regional data sets developed by the CRB will become the preferred source in the region
	• Opportunities for cost reduction and efficiencies for GIS data creation should be encouraged where economies of scale and avoidance of duplication can be fostered.
Data licensing	• If a municipality provides data that is covered under a third party agreement (e.g. St. Albert cadastral base from AltaLIS), the municipality will be responsible for ensuring the third party approval for sharing with the CRB or another municipality; including ensuring the other municipality or the CRB has signed any required third-party agreements (the CRB may act on behalf of members in facilitating once agreements are developed between the third parties and CRB).
Access to data	• All municipalities will be allowed access to regional data sets.

Protocols

Type	Description
Acquisition of data	• Where the CRB creates new levels or layers of information (e.g. comprehensive regional land use), then such layers will be made available to municipalities based on the Regional Data Sharing Agreement and a cost allocation for participating members (e.g. orthophotography).
	• The CRB will identify the most cost efficient mechanism for acquiring data including acquisition from the Provincial Government where available.
	• A municipality can designate another organization to act on its behalf to provide local GIS services and to collect and distribute GIS data on its behalf.

Methods

Type	Description
Definition of terminology	• Each business priority area (e.g. land use, transit and housing) will be responsible through the planning committees for definition of specific terms, definitions, codes (e.g. land zoning) who will provide that terminology to the CRGIS.
Data sharing	• Data will be provided in an industry standard digital format. Once a technology platform is determined the format may be a shape or other open standard format as defined by the Technical Advisory Group.

Standard

Type	Description
Data	• Terminology related to spatial data will be in accordance with the ISO/TC211 and OGC (Open Geospatial Consortium) terms: • ISO 19115 Metadata; • ISO 19125 Simple Feature Access - Parts 1 & 2; • ISO 19139 Metadata XML Schema Implementation; and • ISO 19115-2 Metadata - Extension for imagery.
	• To be defined: likely based on ISO, FGDC or CGDI standards

Standard

Type	Description
Data Layers	• All data layers shall have a metadata description including data format, projection, scale, description and other metadata criteria as defined.
Technology	• To be defined
Mapping capabilities	• To be defined

Metadata	• The minimum initial criteria required for defining the information about the data layers, known as the metadata include:
	
	  • geographic extent of the municipality;
	  • data for land use, transit and housing;
	  • Industry standard or interoperable format; and
	  • initial Metadata will be prepared for all regional data including:
	
	    – data layer name and brief description;
	    – data layer accuracy;
	    – source information;
	    – geographic feature type;
	    – data dictionary of codes used;
	    – date of last update;
	    – contact information; and
	    – known limitations/disclaimer.

APPENDIX E: GLOSSARY

Term	Definition
Cadastral base map	A map defining land ownership information. Generally used for taxation, planning, zoning and infrastructure management. Often serve as the base map.
Geographic information services	A set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world for a particular set of purposes (Burrough).
Geospatial	Fusion of geography and information technology collection, management, analysis and integration of geo/location based data to enable improved decision and policy making (Federal Inter-Agency Committee on Geomatics).
Geospatial data	Data pertaining to the geographic location and characteristics of natural/constructed features and boundaries on, above or below the Earth's surface (Webster's New MillenniumTM Dictionary of English).
Metadata	Metadata describes other data. It provides information about a certain item's content. For example, an image may include metadata that describes how large the picture is, the color depth, the image resolution, when the image was created and other data. A text document's metadata may contain information about how long the document is, who the author is, when the document was written and a short summary of the document (Wikipedia).

Term	Definition
Methods	The methods are formal agreements between organizations that are sharing people, technology, process or data and explain how the item is being shared and sets out the means and systems CRGIS will adopt when they collect, store, access, compile and analyze information about the region (Wikipedia).
Protocols	Formal agreements between organizations that are sharing people, technology, process or data and explain why the item is being shared and sets out the principles and commitments CRGIS will adopt when they collect, store, access, compile and analyze information within the region (Wikipedia).
Standards	The standards are the content and format for data or technology explaining what data or technology is being shared and sets out the description and common standard CRGIS will adopt when they collect, store, access, compile and analyze information about the region (Wikipedia).

APPENDIX F: LITERATURE REVIEW

Recent CRB related materials

▸ Capital Region Board Regulation, 2008

▸ Working Together Report, December 2007

▸ City-Region Studies Centre, Faculty of Extension, University of Alberta. Regional Governance Models: An exploration of structures and critical practices, October 2007

Past Capital Region GIS related materials

▸ Alberta Capital Regional Alliance Regional Geographic Information System – Implementation Strategy and Governance materials, December 2007

▸ Alberta Capital Regional Alliance Regional Geographic Information System – Preliminary Business Case, December 2007

▸ Alberta Capital Regional Alliance Regional Geographic Information System – Environmental Scan, September 2007

▸ Alberta Capital Region Governance Review: A Regional Geographic Information System Review – Executive Summary, November 2002

▸ Alberta Capital Region Governance Review: A Regional Geographic Information System Review – Final Report, November 2002

Key materials

▸ Government of Saskatchewan, Information Technology Office, Geomatics Council, 2008, http://www.ito.gov.sk.ca/geomatics/

▸ Region of Peel, 2008, http://www.region.peel.on.ca/pw/waterstory/maps_gis.htm

▸ California Geographic Information Association (various documents - strategic plans, regional surveys, workshops, best practices in imagery and workshop notes), 2006-2008, http://www.cgia.org/index.htm

▸ Calgary Regional Partnership (various documents - regional GIS documents - grant applications, business plans, needs assessments and minutes), 2005-2008, http://www.calgaryregion.ca/crp/

▸ San Diego Regional GIS Council (various documents – surveys, presentations and workshops), 2004-2008, http://www.sdrgc.org/index.html

▸ Oldman River Regional Services Commission (various documents – annual grant reports and final report), 2002-2008, http://www.orrsc.com/gisnews.htm

▸ GeoNova, Geographic Gateway to Nova Scotia (various documents – strategy, policies and standards, presentations and workshops), 2002-2008, http://www.gov.ns.ca/geonova/home/default.asp

▸ Bay Area Regional GIS Council (various documents - business plans, risk management plans), 2002-2008, http://www.baama.org/

▸ MetroGIS (various documents - benefits studies, business plans, assessments, workshop and minute notes), 1999-2008, http://www.metrogis.org/

▸ California GIS Council, 2008, (various documents – plans, charters, GIS framework data survey and governance), 1993-2008, http://gis.ca.gov/council/

▸ New York State GIS Clearinghouse (various documents – models of collaboration, strategic plans and data descriptions), 1992-2008, http://www.nysgis.state.ny.us/

▸ Where We're At and Where We're Going with Regional GIS: Interim Regional GIS Report, Calgary Regional Partnership, October 2007

▸ Institutional Linkages for National and Regional GIS – Management Issues, Opportunities and Challenges, Mark Sorensen, Geographic Planning Collaborative (a conference paper) 2007

▸ Regional Geographic Information System (RGIS), Best Practices and Technology Trends, Chas Evans & Strategy Plus, March 2007

▸ New Regionalist Metropolitan Action: The Case of the Alberta Capital Region Alliance, Edward C. LeSage, Jr. and Lorna Stefanick, Presented at the Canadian Political Science Association meetings, Winnipeg, June 2004

▸ Creating a Stronger Edmonton Region, City of Edmonton, Prepared by Hemson Consulting Ltd., February 2007

▸ Feasibility Report on Regional GIS to City of Edmonton Executive Council, 2002

▸ Regional Land Inventory Project: Phase 1, Leduc/Nisku Economic Development Authority, 2002

SECTION 19

APPENDIX G: BEST PRACTICE RESEARCH

Regional GIS

Despite the major technological advancements in GIS and the extensive efforts expended in spatial data development over the last decade, the state of the art in GIS for use in monitoring regional efforts toward land use and urban growth management is far below what is now technically feasible.

The reasons include:

▶ Regional cooperation and communication have not been well established

▶ GIS is most frequently employed for infrastructure management and tax assessment and planning

▶ The majority of GIS endeavors draw on local contributions and grants, such as Alberta Oldman River Regional Services Commission (ORRSC) and Palliser Regional Information Services (PRISM), which are generally less stable when compared to continuous funding

▶ Formalized inter organizational mechanisms and agreements on standards, rules and responsibilities are underdeveloped

▶ Data is often available: however, it is regularly updated in only a small segment of areas and not consistently across a region.

Alberta Examples of Regional GIS

Several examples exist in Alberta reflecting efforts toward regional geographic information services or systems.

They include:

▶ Palliser Regional Information Systems (PRISM), Palliser Region

▶ Oldman River Regional Services Commission (ORRSC)

▶ Calgary Regional Partnership

Each of the above varies in its mandate. The PRISM and ORRSC examples are essentially extensions of regional planning services provided on a cooperative and shared basis. Both of these initiatives have received funding from the Government of Alberta for the GIS initiatives.

The ORRSC initiative is an example of a strategic partnership that has produced a valuable municipal practice that all partners benefit from. The project initially involved 18 medium and small municipalities and a regional services commission in southwest Alberta, who, through intermunicipal cooperation and innovation, worked together to create a comprehensive, cooperative, and centralized geographic information system. The ORRSC today represents some 36 municipalities.

The system shares centralized infrastructure and staff while ensuring confidentially and privacy of individual municipal information. A key observation about this initiative is that many, if not all, municipalities had no or basic GIS at the onset of the project.

North American Examples of Regional GIS

Numerous examples of regional, state or provincial geographic information services or systems can be found across North America. They include:

- Information Services Corporation, Province of Saskatchewan
- GeoNOVA, Nova Scotia
- Region of Peel, Ontario
- California Geographic Information Association, California
- New York State GIS Clearinghouse, New York
- MetroGIS, St. Paul/Minneapolis, Minnesota
- SANDAG, San Diego California

The MetroGIS is a multi-participant GIS initiative helping local governments and other organizations serving the seven-county Minneapolis-St. Paul Metropolitan Area. MetroGIS helps the members more effectively carry out their business operations and manage costs through sharing data and collaboratively addressing other common GIS related needs.

MetroGIS is in effect aimed at institutionalizing data sharing so its stakeholders can easily obtain accurate and reliable data they need from others to carry out their business functions, in the form they need it. A broadly participatory process was used to achieve consensus on a variety of matters critical to the success of MetroGIS.

Key lessons (or fundamental principles) from the MetroGIS initiative:

▶ actively involve policy makers;

▶ promote understanding;

▶ seek consensus on policy decisions;

▶ represent diverse perspectives;

▶ maintain focus on business information needs;

▶ focus on stakeholder benefits;

▶ acknowledge fair-share contributions; and

▶ compensate for costs of collaboration.

MetroGIS identified the importance of starting with clear business needs relating to specific information needs (e.g. decision making, analysis), identifying common and shared data requirements and then developing protocols, methods and standards to support specific data and application requirements.

A recent survey of many of the United States Regional GIS cooperatives, including MetroGIS and SANDAG, identified 17 key practices fundamental to their abilities to achieve their respective visions. Six of these key practices include:

▶ broad support for vision and expectations;

▶ champion individuals and community support;

▶ knowledgeable and respected participants;

▶ maintain contact with national (higher order) organizations;

▶ proactive, open and inclusive process and procedures; and

▶ enable maximum participation and diverse perspectives.

Spatial Data Infrastructures

The development and implementation of spatial data infrastructures, the core of any regional GIS, was identified by Mark Sorensen, a U.S. based GIS expert[5], as needing to go through predictable phases including:

> Awareness – the recognition of a need and awareness of the technological opportunities;

> Commitment building – establishing the mandate and resources for an implementation;

> Planning and design – plan and design a framework and program for implementation;

> Foundation building – the effective institutional linkages where none have previously existed;

> Proliferation, maintenance and maturation – moving from databases to business applications; and

> Technology innovation and adaptive management – technology is dynamic and management of the innovative use of that technology is required.

Common barriers in developing shared spatial data infrastructures have been identified from various research and include:

> No existing data sharing culture – working against ingrained practices and processes;

> No clear mandate for coordination – assumption that spatial data infrastructure simply exists;

> Data are sensitive – differing views on who can access the data ;

> Data are proprietary – specific data sharing licenses exist about data use;

> Pressure for cost recovery – organizations seek value and revenue from data; and

> Lack of resources for development of shared databases – consciously changing the conventions of who creates, "owns" and maintains the source data is difficult.

The above observations illustrate several requirements for the CRGIS and its implementation:

> Education of decision makers is essential.

> Data is the core of any successful regional GIS.

> An early focus on data sharing protocols, methods and standards is required.

> Progress will be incremental.

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5 Mark Sorensen, Geographic Planning Collaborative Inc.

SECTION 20

APPENDIX H: MAP OF CAPITAL REGION

This is a map of the Capital Region including surrounding boundary municipalities.